

# **Introduction to 3G Mobile Communications**

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transmitted as it normally would be via all cells. Because only one base station is transmitting in downlink data channels, the interference level is lower than with normal SHO.

The working principle of the SSDT is that the UE selects one of the cells from its active set to be the primary cell, and the other cells are nonprimary. Only the primary cell transmits in the downlink data channels. Each cell in the active set is assigned a temporary identification. The UE periodically informs the UTRAN about the current primary cell ID. This information is delivered via the uplink feedback information (FBI) field. The primary ID is updated by the UE at a period of 5, 10, or 20 ms.

In order for the UE to continuously perform measurements and to maintain synchronization, the nonprimary cells must continue to transmit pilot information on the DPCCH in case the situation in the air interface changes.

SSDT and the coding of FBI bits are discussed in [6].

### 3.4.4 Antenna Diversity

Antenna diversity means that the same signal is either transmitted or received (or both) via more than one antenna element in the same base station. Antenna diversity can sometimes also be applied to the UE. Transmission and receiver antenna diversities are not the same, and thus they are discussed separately in this section. Here only base station transmission/reception diversity is considered. Antenna diversity in mobile terminals is problematic: it is expensive and tends to increase the size of mobiles beyond what the market will accept.

#### 3.4.4.1 TX Diversity (Base Station)

Transmitter-antenna diversity can be used to generate multipath diversity in places where it would not otherwise exist. Multipath diversity is a useful phenomenon, especially if it can be controlled. It can protect the UE against fading and shadowing. TX diversity is designed for downlink usage. Transmitter diversity needs two antennas, which would be an expensive solution for the UEs.

The UTRA specifications divide the transmitter diversity modes into two categories: (1) open-loop mode and (2) closed-loop mode. In the open-loop mode no feedback information from the UE to the Node B is available. Thus the UTRAN has to determine by itself

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